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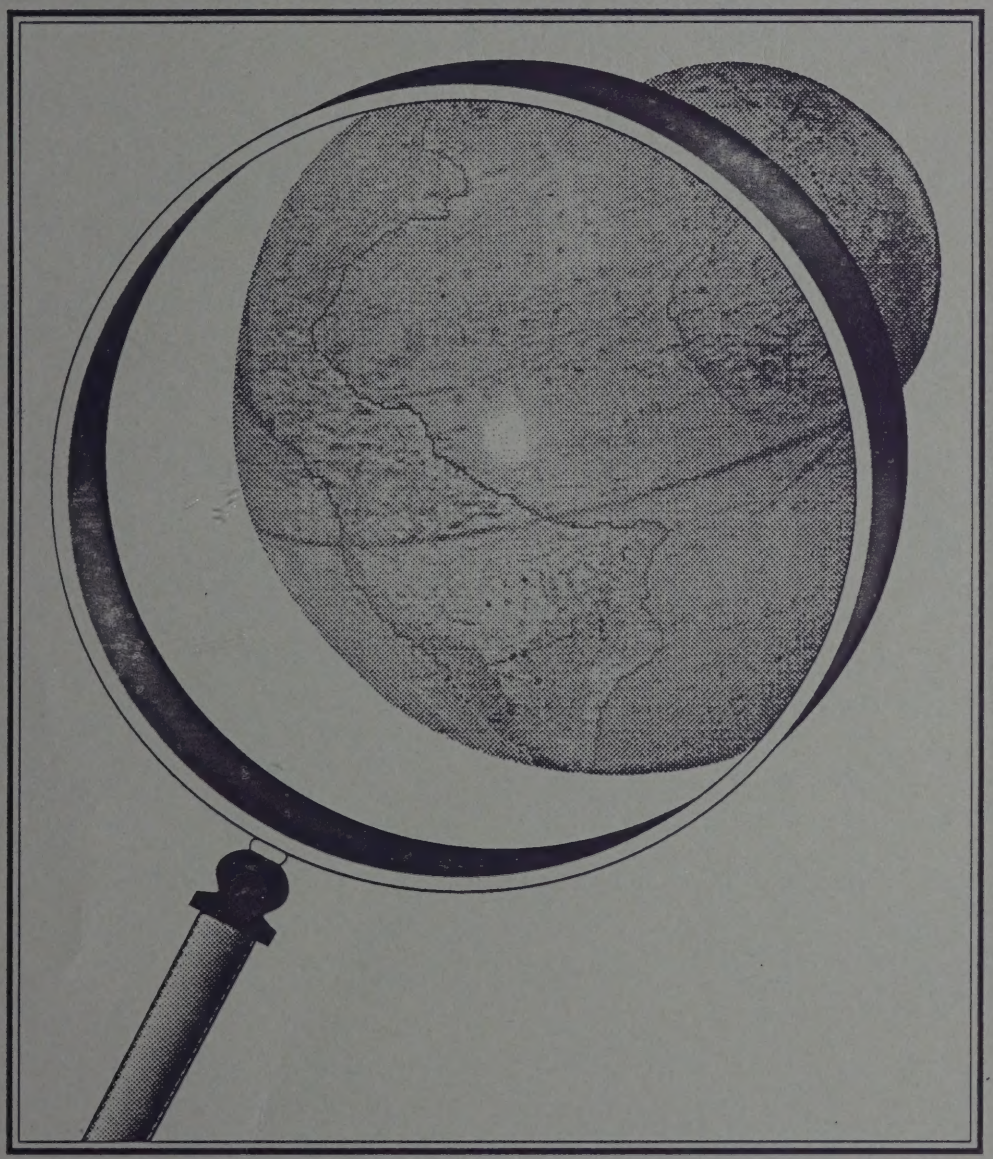
Science and the Public Lands

Recommendations for a Research Program in the Bureau of Land Management

by
James E. Bowns, Ph.D.
William Burnham, Ph.D.



National Public Lands Advisory Council
Research Task Force
March 1991

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Table of Contents

Page

Introduction 1

Methods 3

Findings 5
- Present Status of BLM's Research Program 5
- Summary of Interview Comments 5
- Research Needs 7

Recommendations of Task Force 11

Introduction

The National Public Lands Advisory Council was requested by Bureau of Land Management (BLM) Director Cy Jamison to review the Bureau's existing research program and scientific information needs and to provide recommendations to the Secretary of the Interior. A Council task force comprised of Dr. James E. Bowns (chair), Dr. William Burnham, and John Gram conducted the review and Drs. Bowns and Burnham prepared this report. The task force recommendations were presented for approval by the full Council at a Washington, D.C. meeting on March 21, 1991.

The Bureau of Land Management is a unique Government agency charged with a diversity of responsibilities, including range and watershed management, forestry, fish and wildlife management, recreation, gas and oil leasing and monitoring, licensing of mineral exploration and recovery, recreation, cadastral survey, and much more. The approximately 270 million acres of public lands administered by BLM range from arctic tundra and boreal forests to grasslands and deserts. These responsibilities are mandated by several Acts of Congress, especially the Federal Land Policy and Management Act of 1976, and are implemented on the basis of multiple use and sustained yield, which is a difficult and challenging assignment.

A research program in BLM should support the Bureau's vision of carrying out a land management ethic based on balancing the use of lands and resources to meet the environmental, economic development, and social needs of the Nation for the present and future generations. The long-term goal of such a program should be to strengthen research, science, and technical development efforts and enhance the Bureau's ability to resolve regional and national resource issues. In addition, the program would need to address the growing global environmental issues.

Methods

The authors interviewed individuals from the Bureau's management, from the research staffs, and from State and District Office administrative staffs. Interview questions related to current research activities and needs as well as future needs and recommendations. Current Bureau documents relating to research were also reviewed. Personnel in research programs of the Fish and Wildlife Service and Forest Service were interviewed as well. In addition, faculties at universities involved with Government research programs were interviewed and their recommendations were incorporated.

Based on the above review and the professional research experience of the authors, a draft document was prepared and provided to Deputy Assistant Director for Support Services John Moeller and Acting Chief of Resource Sciences Dr. John Haugh for their review and comments. The final document was prepared after considering their comments but does not necessarily reflect any other person's or organization's opinions.

Findings

Present Status of BLM's Research Program

The Bureau's research and development program for FY91 totals about $5 million and consists mainly of cooperative research projects accomplished by Federal research agencies and universities. The funds are derived from the benefitting program activities such as range, wildlife, timber, etc. Overall management and tracking of the research program is accomplished by Dr. John Haugh and Bruce Van Haveren, Research Program Manager, Division of Resource Services, Service Center. Decisions regarding what research is to be accomplished are made by program offices and the "Field Committee," which is composed of the Associate State Directors. State Directors initiate most research within their geographical areas of responsibility, based on their critical needs at that time.

Management decisions based on accurate information developed by experts and programs implemented efficiently and effectively with good results instills public confidence. Based on our review of the Bureau research program, a high level of confidence does not currently exist. Although almost $5 million is spent annually and 79 Ph.D.-level staff positions are reported to exist within the Bureau, results seem inadequate to instill public confidence or support of the Bureau's program activities and management decisions. Results from the expenditure of funds are reportedly less than desired and very few of the Ph.D.-level staff are actually involved in research.

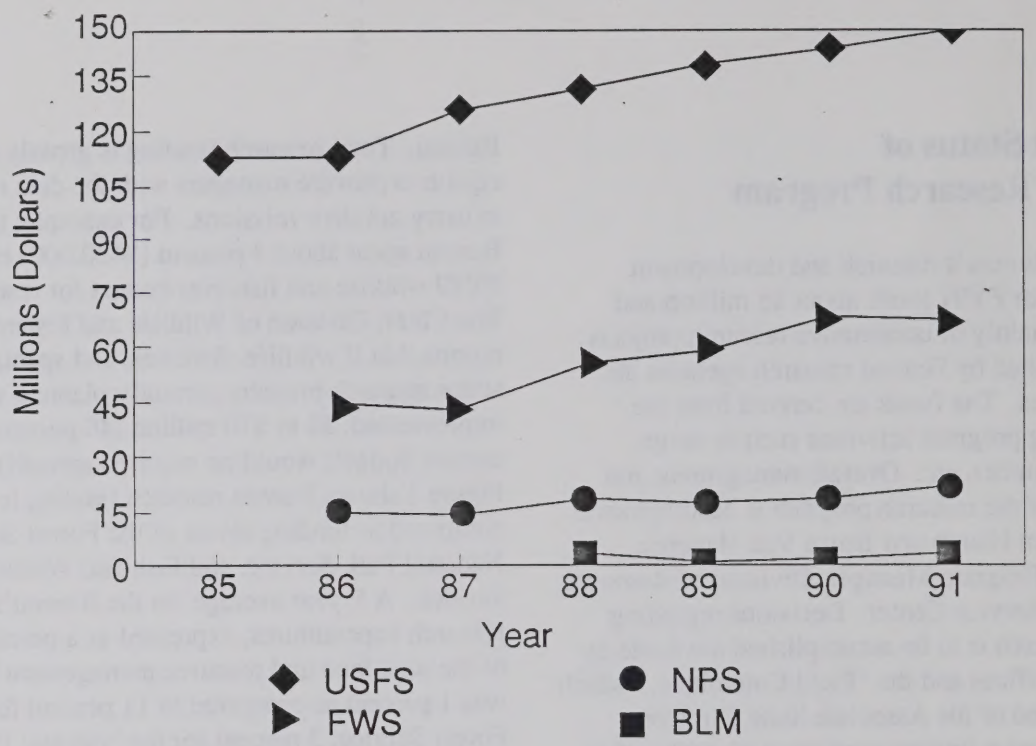
Funding for Bureau research projects is presently obtained from operations budgets in contrast to line-item funding characteristic of the Forest Service and Fish and Wildlife Service. Most research funding appears to be contracted through consortiums or as partnerships through the challenge cost-share program. Apparently the research is less focused than desired, a fact which results in less than desired benefit or credit to the Bureau. Total research funding is grossly inadequate to provide managers with the data needed to carry out their missions. For example, the Bureau spent about 3 percent ($420,000) of its FY89 wildlife and fisheries budget for research. The Chief, Division of Wildlife and Fisheries, reports that if wildlife, fisheries, and special plant status research projects currently planned were implemented, $8 to $10 million (40 percent of the current budget) would be required annually. Figure 1 shows Bureau research funding levels compared to funding levels of the Forest Service, National Park Service, and Fish and Wildlife Service. A 5-year average for the Bureau's research expenditures, expressed as a percentage of the total land and resource management budget, was 1 percent as compared to 11 percent for the Forest Service, 3 percent for the National Park Service, and 16 percent for the Fish and Wildlife Service. When budget cuts or urgent financial needs arise, the Bureau's research projects are some of the first areas to be cut. Long-term research, although frequently the most beneficial and necessary, is hardest hit as few Bureau personnel will support the initiation of projects because of financial uncertainties. Therefore, designated and substantial funding levels for research are critical and must be sustained over time.

Summary of Interview Comments

1. The Bureau is in dire need of adequate scientific information to make decisions and to enhance its credibility with the public, peers, and Congress. On a practical level, Bureau personnel desperately need better information and quantified supporting data for policy formation and management decisions.

2. A career ladder program for research personnel, similar to that currently existing for managers and administrators, is needed

Figure 1. Research funding of natural resource management agencies.



to attract and retain quality personnel. Bureau researchers located at universities should be jointly selected by the Bureau and the university, subjected to the same criteria for tenure and promotion, and able to teach courses or seminars and guide graduate student research programs. A good model for such a cooperative research relationship is the Fish and Wildlife Service's Cooperative Research Units program.

3. An effective method of research information and technology transfer between researchers and management should be established to expedite research results from the researchers to the field personnel. Information should be provided in a concise, useful, and understandable form.

4. Establishment of a line-item or subactivity appropriation for research is critical instead of the current method of diverting dollars from existing programs. Diverting dollars from field programs creates many problems, as this practice discourages managers from requesting research that is needed but which might deplete their already inadequate funds.

5. The research program should have its own assistant director in Washington, D.C. so there is adequate top-level representation within the Bureau. Concern exists that research will be the first area to be cut during difficult financial and/or political times. This position will ensure that research programs will receive the same consideration and support in the budgeting and planning process.

6. A steering committee for coordination and prioritization of research activities should be established. Area, District, and State Office personnel should have priority representation, as they are the most familiar with existing and future management problems

and the information required to meet those needs. Outside expertise should be solicited and involved in this process. It is critical that research be sensitive to management's needs and focused on pertinent questions and issues.

7. The Bureau should be involved in international and global environmental issues such as global change and improve its capacity to provide expertise in land and resource management internationally. This should emphasize the Bureau's unique skills and experience in land and mineral leasing and administration, land use planning, and the development of land information systems and resource management techniques.

8. Qualified scientists with expertise in research and knowledge of researchable questions should serve as project/program coordinators. They should remain active in research and involved with the scientific community while accomplishing their primary job functions.

9. The Bureau should contract with universities and other for-profit or not-for-profit organizations to accomplish research. This will minimize fixed overhead costs and maintain a degree of flexibility of research topics not achievable with career employees. Development of a large infrastructure within the Bureau should be discouraged.

10. Research proposals should require strong peer review prior to acceptance and implementation. High standards should be established and followed to ensure that research results are of high quality and accepted by the scientific community.

11. Advantage should be taken of established partnerships and new ones developed to enhance research programs.

12. Cooperative Research Centers should be established at several universities. These institutions should be selected on the basis of their expertise in certain biomes or ecosystems, and to a lesser extent on their geographical location.

13. Bureau personnel involved in the development of monitoring and data collection need scientific expertise to aid them in the interpretation and evaluation of these efforts. When managers receive outside research proposals for projects on lands they administer, they need scientific expertise for critiques, reviews, assistance, and recommendations.

14. Interdisciplinary research should be encouraged in all program areas. This will ensure that results will be more acceptable to the scientific community as a whole.

Research Needs

Historically the Bureau's constituency has been largely comprised of consumer groups such as ranchers, miners, and loggers. This is changing with increased leisure time and greater interest by the public in recreation and other uses and values of public lands and resources. In order to satisfy these changing interests and continue to accommodate some of the traditional and nontraditional primary uses, new and different information is required. The Bureau requires better scientific information to support its decision making and to enhance its credibility with other agencies, the public, and Congress. Focused research will be needed by the Bureau to develop this data base on a significant, proactive basis.

The Bureau's resource management mandate is based on "multiple use." To manage most resources for sustainable multiple use can be very difficult. Management of resources for one primary designated use on a particular area, with other uses being secondary, is often the more realistic situation. To succeed, multiple use must be "compatible use" where no single use or resource value diminishes another use or value. Most conflict is a result of various interests trying to determine what the priority use of public land or

resources will be. Research that supports the resolution of these conflicts is critical to the effective accomplishment of the Bureau's mission.

Some managers express a great desire for an "in-house" cadre of experts available to advise them on various topics. This includes identification of information gaps and research needs, review and design of research proposals, and design of monitoring and data management systems. There is also a need to support managers when they are dealing with the public and the media to initiate and coordinate research, and to evaluate and interpret monitoring and research results.

It will be necessary to have highly qualified, accomplished scientists on staff who are experts in critical areas of need and who can communicate research results to land managers. It is unlikely that an adequate number of these individuals can be found within the current Bureau personnel. In order to "jump start" the research program, senior professionals will have to be hired. Salaries and advancement opportunities must be sufficient to attract and retain high quality scientists. Positions need to be attractive and prestigious. Scientists should be encouraged to maintain professional affiliations, to participate in professional societies, and to conduct self-directed research to the degree that their primary Bureau responsibilities can still be accomplished. However, there seems to be no justification for the Bureau to retain a large research staff.

Information and research needs exceed the funding resources available now, or in the near future, even if a major program was rapidly implemented. Therefore, the more critical needs must be carefully selected based on priorities of the Bureau. Focus should remain relevant to resource issues that require immediate answers. Whoever, or whatever group, decides which topics will be investigated should be very familiar with the needs of the field personnel and heavily represented and influenced by State Directors, staff specialists, and resource managers. Coordination of the Bureau's overall research effort should be accomplished through a single office. To the degree possible, researchers or coordinators should have the insight to look well into the future, and be proactive in determining future research needs.

Research should, for the most part, be practical or applied. Large projects should be separated into manageable parts and the results integrated. Extremely complex or expensive projects may be unrealistic in light of the Bureau's finances or needs. Investment in very large or long-term projects should be carefully considered and weighed on the basis of applicability and benefit to the Bureau's primary mission. If user groups are the primary beneficiaries of research, they should be encouraged to fund and/or conduct the research.

In order to obtain maximum results for the investment it is important that research be well designed, and that the correct research questions are asked. Peer review of research plans or proposals is essential, but it does not have to become extremely cumbersome and bureaucratic; instead, it should be efficient, accurate, and effective. Quality, not quantity should be the priority. Creativity and enthusiasm should be guided, but never stifled.

Research results should be published in refereed professional journals or other scientifically acceptable outlets. Standards or guidelines should be considered in the preparation of all manuscripts, but especially for journals that have no adequate guidelines. Publication of results will enhance the Bureau's visibility and credibility. Results should also be made available to managers in a practical and usable form, emphasizing the application of research results for the management of resources.

Many times administrators and managers are so concerned with their area of responsibility or simply do not have access to a larger perspective that they have difficulty seeing the "forest for the trees." Seeing the big picture is very important to good management of the individual parts. Several methods have been developed to examine large land areas and handle massive amounts of data that produce good results. Although still evolving, use of remote imagery, GIS (Geographic Information System), and other tools are proving very effective, especially when combined with procedures such as "Gap Analysis." Gap Analysis is a means by which researchers and managers can

obtain a quick overview of the present level of protection afforded biological diversity on public lands. It is important for land managers to identify areas of high biological diversity to facilitate proactive management not only for the critical resource, but also to reduce resource conflicts. Additionally, such procedures allow field data to be collected in such a way as to contribute to the overall knowledge and become part of a valuable management tool. However, to be effective the procedure and programs must be totally compatible to those already used by other Government agencies. Establishment of an up-to-date, compatible, and active program as described above should be a priority of the Bureau and a function of research. All appropriate research, monitoring, or inventory projects should be designed to contribute to this system.

Recommendations of Task Force

1. Quality — Research should be well thought out with prior peer review of proposed projects, annual progress documents (if multiyear), and final reports. Execution should be well-organized, efficient, and considerate of other influencing or affected projects. Results should be published in refereed professional journals or other appropriate scientific outlets and presentations made at meetings of professional societies. Reviews of research proposals, progress, and results should be thorough but not so bureaucratic and laborious that they stifle creativity and discourage competent investigators. Reports and publications should be made available Bureauwide and to the public using an appropriate vehicle for dissemination.

2. Level of effort — The quantity of research should be adequate to justify the Bureau's responsibilities as mandated by law. Quality of research should not, however, be sacrificed for quantity. Familiarity with, and review of, the current literature should be paramount in order to reduce duplication of effort and maintain quality. We recommend that funding levels for research be increased to support the program initiatives discussed in this report and detailed in Table 1; total funding for research should approximate 6 percent of the Bureau's annual budget for management of lands and resources.

3. Types of research — Research should primarily address the needs identified by the Bureau's managers and administrators and support proper management of public lands and resources. In addition to applied research and technology transfer, this should include the need for more "basic" research that will provide valuable information in the near future. Interdisciplinary or transdisciplinary research should be conducted, including socioeconomic and institutional research. Research on national and international topics which may affect public lands is encouraged. These might include topics such as global change, acid rain, hazardous waste disposal, migratory neotropical birds, etc. Research that addresses conflicts or the interface between consumptive and nonconsumptive land uses should increase.

4. Research priorities — Research needs will typically be greater than available funding and therefore prioritization will be mandatory. Although there are always unexpected problems and questions that arise and certainly a backlog of existing important topics, the Bureau's research program must begin to become proactive. Research should be prioritized using a combination of global and international (10 percent), national (30 percent), and regional (60 percent) topics. Additionally, a mix of long-term (>5 years) and short-term (1 to 5 years) projects should be considered. Long-term projects are sometimes needed to document changes that may occur slowly in some ecosystems. We recommend a mixture of 70 percent short-term and 30 percent long-term projects.

5. Personnel — Most research (approximately 80 percent) should be contracted to universities, nonprofit organizations, and other qualified institutions or organizations rather than conducted by a greatly increased Bureau research staff. However, the Bureau staff should include several highly qualified and accomplished scientists familiar with current literature and having expertise in key

Table 1. Research funding projections, 1991-1996 in thousands of dollars.

Subactivity	1991	1992	1993	1994	1995	1996
Minerals	$ 70	$ 100	$ 500	$ 1,000	$ 1,000	$ 2,000
Forestry (Public Domain)	0	0	0	0	0	0
Forestry (O&C)	2,828	4,000	5,000	6,000	7,000	9,000
Wild Horses & Burros	0	0	250	250	250	250
Range	835	1,500	2,000	3,000	5,000	6,000
Recreation/Wilderness	35	100	400	600	800	1,000
Soil, Water, Air	30	300	400	600	800	1,000
Wildlife/Fisheries	350	1,500	3,000	5,000	8,000	10,000
Fire	138	588	1,140	1,250	1,400	2,000
Engineering	0	0	0	0	0	0
Cadastral Survey	350	350	200	200	400	500
Land Information Systems	0	50	50	100	100	150
Hazardous Materials Management	0	0	0	0	0	0
Planning & Env. Systems	0	50	100	200	400	500
International Activities	0	50	500	1,000	1,500	2,000
Global Change Research	1,000	3,000	3,000	3,400	3,600	4,000
Global Change Mars Research	0	0	500	1,500	2,000	2,000
TOTALS	**$5,636**	**$11,588**	**$17,040**	**$24,100**	**$32,250**	**$40,400**

topical areas to guide research and coordinate and implement projects. Researchers should be available to advise Bureau managers at all levels. Adequate employment benefits, salaries, and career advancement opportunities should be provided to encourage the acquisition and retention of highly qualified scientists. Scientists should be placed in research-grade positions, which may necessitate a career ladder separate from the Bureau's traditional management-track career ladder.

6. Organization — Overall coordination of the Bureau's science activities should be conducted from a single office at the Headquarters level. This office should be located at a high level in the Headquarters organization to provide visibility and ensure adequate representation and support for the program. The administrative and technical aspects of the research program should be coordinated at the Service Center, but individual researchers should reside within various program areas. State, District, and Area Offices should have ready access to the research expertise in each program area. Recommendations for prioritization of research topics or projects should be accomplished by a relatively small research

evaluation committee which meets annually, or more often as needed, with representatives of major interest areas. The committee's recommendations would then be reviewed by the Field Committee and approved by the Director.

It would be presumptuous of us to detail a table of organization for the Bureau's research program. The Bureau's Director, with input from Assistant Directors, State Directors, and the Research Program Office, should make the final decision on organizational matters. However, we offer the following suggestions. First, the Washington Office should (a) provide overall coordination, (b) develop strategies and priorities, and (c) ensure adequate funding levels for the entire Bureau. The State Offices would then (a) develop statewide research needs and priorities, with input from District and Area Offices, (b) supervise and administer statewide research, (c) ensure literature and peer reviews of proposals and reviews of research reports, (d) provide consultation to District and Area Offices on research issues, and (e) provide training needed to support research, monitoring, and data collection. District Offices would (a) determine District research needs and priorities, (b) accomplish literature searches and assist in problem solving, (c) provide hands-on expertise for research and (d) supervise local research projects. Area Offices would (a) identify research needs and priorities and (b) provide hands-on application of research results. Finally, the Service Center would (a) provide administrative support for the national research program, (b) handle contracting for large, complex research projects, (c) provide technology transfer, (d) coordinate national research initiatives, and (e) provide specialized technical expertise to other Bureau offices.

A large infrastructure for research is discouraged. We recommend that the Bureau develop partnerships and cooperative agreements to implement its research program.

7. Cooperative Research Centers — If stable funding is established, six to eight Cooperative Research Centers should be established similar in concept to the Bureau's "Raptor Research and Technical Advisory Center" (RRTAC). RRTAC is a cooperative program involving the Bureau, Idaho's three state universities, Idaho Department of Fish and Game, U.S. Fish and Wildlife Service, and The Peregrine Fund, Inc., a private nonprofit organization. Cooperative Research Centers should concentrate on natural resource management themes or biomes such as the arctic, forests, grasslands, the hot and cold deserts, or pinyon-juniper woodlands, unless a strong justification exists for a more focused approach. Investigations could be accomplished in various disciplines as needs require. Ideally, the Centers would be located at universities in proximity to the respective ecological biomes or at universities with proven strengths in the respective themes of concern. However, the institutions should have faculty and facilities able to and willing to support the Bureau's needs. The Centers should closely cooperate with and not duplicate activities of U.S. Fish and Wildlife Service, Agricultural Research Service, and U.S. Forest Service research units. Selection and formation of each Cooperative Research Center should require specific approval of the Director and should be consistent with the Bureau's overall research strategy.

8. Research themes — Areas of research emphasis would generally fall into one of the following categories:

   Socio-Institutional Issues — understanding people and natural resource relationships and determining institutional mechanisms to manage resource conflicts.

Land Use Allocation and Resource Productivity — research that determines how to balance protection and sustainable production of natural resources.

Integrated Resource Management and Environmental Improvement — the development of systems to manage resources in an integrated manner in concert with quality environmental management objectives.

Understanding Climatic and Hydrologic Systems and Ecosystem Processes — biome- or ecosystem-centered research that determines structure and function of systems the Bureau is responsible for managing. This includes understanding and predicting global change effects on lands and resources.

Methods and programs used by the Bureau to collect field data should be of the same or better quality as those employed by other Government agencies. Field data, combined with remote imagery and organized by GIS, are important tools for managing public lands and resources. For example, gap analysis should be used to determine present level of protection afforded biological diversity, an important component of multiple-use management. Information provided by this research will allow for better management and decision making, identify critical areas and gaps in information, and assist in prevention of future conflicts between interest groups.

9. Funding mechanism — A line-item or separate subactivity for research should be established in the Bureau's annual budget and the Congressional appropriation. If this is not possible, a funding strategy should be devised that apportions the costs of research across major program areas and provides for an adequate funding base for research. Cooperative Research Centers will require stable funding in order to be effective. It is important that funding be adequate not only to initiate, but to maintain a long-term significant research program within the Bureau. Without proper funding, the Bureau's ability to direct and manage public lands and resources knowledgeably will be compromised and this inability will subject the agency and its personnel to greater public criticism and distrust.